Claims

1. A device, comprising:

a disk holder operable to hold and spin an optical disk, said disk having a transparent substrate having first and second opposing substrate surfaces, an active recording layer formed over said second substrate surface, and a reflective layer formed over said active recording layer;

an optical head with an optical numerical aperture greater than unity and less than a refractive index of the transparent substrate and having an optical interfacing surface which is operable to couple radiation energy to and from the optical disk for reading data from or writing data to the optical disk;

an actuator engaged to said optical head to move and position said optical head facing the first substrate surface of the disk by a spacing less than one wavelength of the radiation energy; and

an electromagnet coupled to said actuator and positioned on the same side of the said second substrate surface to produce a magnetic field at a location of said active recording layer where said optical head focuses an optical beam.

2. The device as in claim 1, wherein said first substrate surface is a flat surface.

3. The device as in claim 1, wherein said optical head includes a coupling lens having a first spherical optical surface and a second, opposing optical surface, wherein said optical interfacing surface is a portion of said second optical surface.

4. The device as in claim 3, wherein said optical head includes an objective lens to couple optical energy to or from said coupling lens.

5. The device as in claim 3, wherein said coupling lens is a solid immersion lens.

6. The device as in claim 1, wherein said optical disk further comprising a grating layer formed between said active recording layer and said reflective layer to produce an optical servo signal.

7. The device as in claim 6, wherein said grating layer is formed from a photo-polymer layer.

8. The device as in claim 1, wherein said active recording layer is a flat and smooth layer.

9. The device as in claim 1, wherein said substrate has a thickness to place said first substrate surface out of focus of said optical head.

10. A device, comprising:

a transparent substrate having first and second flat substrate surfaces;

an active recording layer formed over said second flat substrate surface to store information;

a grating layer formed over said active recording layer and having a grating structure; and

a reflective layer formed over said grating layer to reflect light.

11. The device as in claim 10, wherein the grating layer is formed from a photo-polymer layer.

12. The device as in claim 10, further comprising a transparent protection layer over said first flat substrate surface.

13. The device as in claim 12, wherein said protection layer is formed from a carbon-containing material.

14. A device, comprising:

a disk holder operable to hold and spin an optical disk, said disk having a transparent substrate having first and second opposing substrate surfaces, a active recording layer formed over said second substrate surface, and a reflective layer formed over said active recording layer, wherein said first substrate surface is flat;

an optical head with an optical numerical aperture greater than unity and less than a refractive index of the transparent substrate and having an optical interfacing surface which is operable to couple radiation energy to and from the optical disk for reading data from or writing data to the optical disk; and

an actuator engaged to said optical head to move and position said optical head facing the first substrate surface of the disk by a spacing less than one wavelength of the radiation energy.

15. The device as in claim 14, wherein said active recording layer includes a magneto-optical material for light intensity modulation, direct overwrite ("LIMDOW") recording material.

16. The device as in claim 14, wherein said active recording layer includes a phase-change recording material.

17. A method, comprising:

causing an optical head to have a total numerical aperture greater than unity;

causing an optical disk to have a transparent substrate with a first flat substrate surface and a second, opposing substrate surface, a recording layer formed over said second substrate surface, and a reflective layer formed over said recording layer, wherein the transparent substrate has a refractive index greater than said total numerical aperture of said optical head;

causing said optical head to be used to couple optical energy between the optical head and the optical disk at least in part via evanescent coupling by facing the optical head to said first flat substrate surface to focus light at said recording layer; and

causing a reflected optical signal from the optical disk to be detected to extract optical servo information.

18. The method as in claim 17, wherein a grating layer is formed between the recording layer and the reflective layer to produce an optical servo signal.

19. The method as in claim 17, further comprising causing an electromagnet to be placed on the opposite of the optical disk to produce a magnetic field at a location in the recording layer where the optical head focuses an optical beam.